WHAT IS CLAIMED IS:

1. A hetero bipolar transistor comprising:

a semiconductor substrate;

a first semiconductor layer formed on the semiconductor substrate and comprised of a crystal containing silicon and germanium;

a second semiconductor layer formed on the first semiconductor layer and comprised of a crystal containing silicon and germanium, at least a portion of the second semiconductor layer functioning as a base layer; and

a third semiconductor layer formed on the second semiconductor layer and comprised of a crystal containing silicon, at least a portion of the third semiconductor layer functioning as an emitter layer,

wherein the second semiconductor layer includes regions each having a germanium composition ratio that varies stepwisely with a difference of 2.5% or more, in the vicinity of a boundary between the first semiconductor layer and the second semiconductor layer and a boundary between the second semiconductor layer and the third semiconductor layer.

2. A hetero bipolar transistor comprising:

a semiconductor substrate;

a first semiconductor layer formed on the semiconductor substrate and comprised of a crystal containing silicon and germanium;

a second semiconductor layer formed on the first semiconductor layer and comprised of a crystal containing silicon and germanium, at least a portion of the second semiconductor layer functioning as a base layer; and

a third semiconductor layer formed on the second semiconductor layer

and comprised of a crystal containing silicon, at least a portion of the third semiconductor layer functioning as an emitter layer,

wherein the second semiconductor layer includes a region having a germanium composition ratio that varies stepwisely with a difference of 2.5% or more, in the vicinity of a boundary between the first semiconductor layer and the second semiconductor layer.

3. A hetero bipolar transistor comprising:

a semiconductor substrate;

a first semiconductor layer formed on the semiconductor substrate and comprised of a crystal containing silicon and germanium;

a second semiconductor layer formed on the first semiconductor layer and comprised of a crystal containing silicon and germanium, at least a portion of the second semiconductor layer functioning as a base layer; and

a third semiconductor layer formed on the second semiconductor layer and comprised of a crystal containing silicon, at least a portion of the third semiconductor layer functioning as an emitter layer,

wherein the second semiconductor layer includes a region having a germanium composition ratio that varies stepwisely with a difference of 2.5% or more, in the vicinity of a boundary between the second semiconductor layer and the third semiconductor layer.

4. The hetero bipolar transistor according to Claim 1, wherein the second semiconductor layer contains silicon, germanium, and carbon.

5. The hetero bipolar transistor according to Claim 1, wherein the second semiconductor layer is comprised of a plurality of sublayers having different germanium composition ratios, and the number of the sublayers is not less than 2 and not more than 6.

6. The hetero bipolar transistor according to Claim 1, further comprising a marker layer formed between the first semiconductor layer and the second semiconductor layer, wherein the marker layer has a germanium composition ratio higher or lower than a germanium composition ratio of the first semiconductor layer by 2.5% or more and is comprised of a crystal containing at least silicon and germanium.

7. The hetero bipolar transistor according to Claim 1, further comprising a marker layer formed between the second semiconductor layer and the third semiconductor layer, wherein the marker layer has a germanium composition ratio higher than a germanium composition ratio of the third semiconductor layer by 2.5% or more and is comprised of a crystal containing at least silicon and germanium.

8. A hetero bipolar transistor comprising:

a semiconductor substrate;

a first semiconductor layer formed on the semiconductor substrate and comprised of a crystal containing silicon and germanium;

a second semiconductor layer formed on the first semiconductor layer and comprised of a crystal containing silicon and germanium, at least a

portion of the second semiconductor layer functioning as a base layer; and

a third semiconductor layer formed on the second semiconductor layer and comprised of a crystal containing silicon, at least a portion of the third semiconductor layer functioning as an emitter layer,

wherein the second semiconductor layer includes regions each having a bandgap that varies stepwisely with a difference of 18 meV or more, in the vicinity of a boundary between the first semiconductor layer and the second semiconductor layer and a boundary between the second semiconductor layer and the third semiconductor layer.

9. A method of measuring a thickness of a semiconductor layer in a hetero bipolar transistor including:

a semiconductor substrate;

a first semiconductor layer formed on the semiconductor substrate and comprised of a crystal containing silicon and germanium, the germanium having a constant concentration;

a second semiconductor layer formed on the first semiconductor layer and comprised of a crystal containing silicon and germanium, at least a portion of the second semiconductor layer functioning as a base layer; and

a third semiconductor layer formed on the second semiconductor layer and comprised of a crystal containing silicon, at least a portion of the third semiconductor layer functioning as an emitter layer,

the method comprising measuring a thickness of the second semiconductor layer,

wherein the second semiconductor layer is comprised of a plurality of

sublayers,

a composition ratio of germanium contained in a first sublayer is different from a composition ratio of germanium contained in a second sublayer adjacent to the first sublayer, and

a first boundary between the first semiconductor layer and a sublayer of the second semiconductor layer which is adjacent to the first semiconductor layer, where the composition ratio of germanium varies discontinuously, and a second boundary between the third semiconductor layer and a sublayer of the second semiconductor layer which is adjacent to the third semiconductor layer, where composition ratio of germanium varies discontinuously, are detected by using a spectroscopic ellipsometer, to define a distance between the first boundary and the second boundary as the thickness of the second semiconductor layer.

10. The method of measuring a thickness of a semiconductor layer in a hetero bipolar transistor according to Claim 9, wherein each of the plurality of sublayers contains germanium of a composition ratio of 1.5 % or more, and a difference in composition ratio between the germanium contained in the first sublayer and a composition ratio of the germanium contained in the second sublayer is 1.5 % or more.

11. The method of measuring a thickness of a semiconductor layer in a hetero bipolar transistor according to Claim 9, wherein each of the plurality of sublayers contains germanium of a composition ratio of 2.5 % or more, and a difference in composition ratio between the germanium contained in the

first sublayer and the germanium contained in the second sublayer is 2.5 % or more.